Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

very long, in seven to ten pairs. Spikes 10 to 30 cm. in length, their lower portion often submerged.

A few of the intermediate flowers perfect. Petals oval, rose-colored. Stamens four. Fruit in specimens sent by the collector, Mr. Pringle, about 2 mm. long by 1 to 1½ mm. broad, the carpels sharply angled and ridged and occasionally scabrate on the back, with a deep, narrow groove between them.

No. 2,017, Pringle, Chihuahua, Mexico, Oct., 6, 1888.

11. *M. laxum.* Shutt. in Chapman Fl. 143 (1860).

Leaves in whorls of fours, the floral usually shorter than the flowers, the lowest pectinate-toothed or pinnatifid, the uppermost entire, linear or narrowly spatulate, sometimes all of them minute, leaving the spike apparently naked ; submerged 10 to 20 cm. in length, the capillary divisions about five on a side, and placed irregularly on the rachis. Petals pink, sub-persistent. Stamens eight. Fruit nearly 2 mm. long, by 1¼ mm. wide ; carpels rounded on the back, strongly tuberculate-rugose.

Ponds in middle and west Florida (Chapman).

12. *M. Farwellii.* Morong.

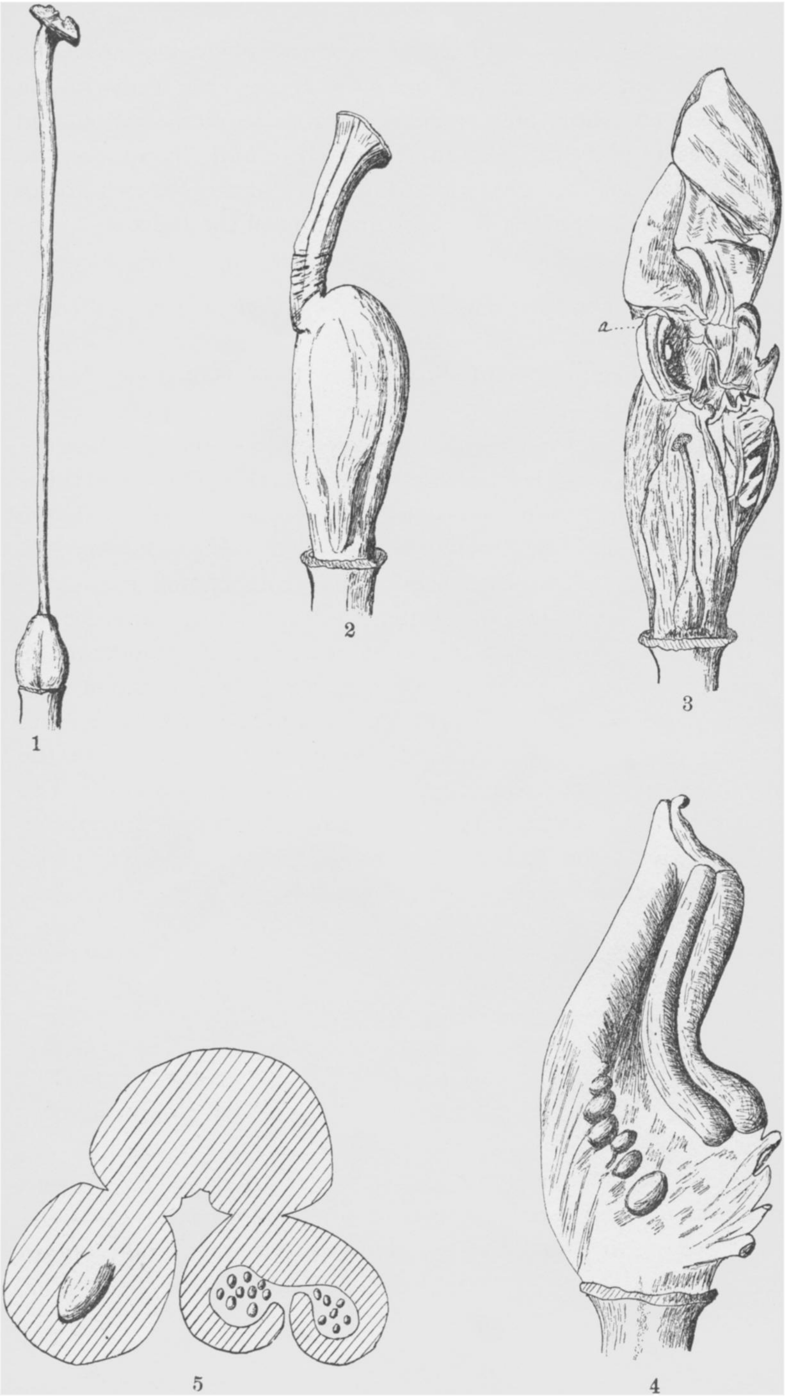
Recently published in these columns—BULL. TORR. BOT. CLUB, for May, 1891. Collected by O. A. Farwell on the Keweenaw Peninsula, Michigan.

Intra-carpillary Pistils and other Floral Derangements.

By BYRON D. HALSTED.

Plate CXXI.

The normal *Petunia* flower is five-merous with its stamens adherent to the corolla tube for one half their length. In the double varieties, instead of these five stamens there may be from none to seven perfect ones, with a range of from one to fifteen which are partly transformed into petals. An average of fifteen blossoms gave 3.7 perfect stamens, and 5.3 more or less petaloid. As the corolla proper is trumpet shaped, the transformed stamens have but little space in the tube, and the petaline structures, therefore, are usually much twisted and contorted, especially for the lower portion, and frequently they are united to each other and to the inner wall of the surrounding corolla. In studying these peculiar flowers as found in abundance in the gardens, my attention was drawn to the unusual size of the petals, which, instead



Intra-Carpilary Pistils and other Floral Derangements.

Byron D. Halsted.

of having a long, slender style, carrying a green capatate stigma above the throat of the corolla, it was short and broad, and often somewhat contorted. Upon a closer inspection of this organ it was found that the contents of the pistil consisted of stamens, some of which were partly changed into petals, often highly colored, while in the center of all was a small pistil, perhaps one-third the normal size. A large number of these pistils were examined and the average was 2.73 normal stamens, about one petaloid structure, and .73 central pistil. It had lost its original shape, the color was white, or purple, in part, the top not closed, but ending in a number of tips, each bearing a portion of the peculiar green-colored stigma, while from within arose a number of tips of highly colored petals, which were much crumpled toward the base and inclosed by the ovary. When torn open such pistils contained but few normal stamens, and in the center of all stood the secondary pistil of the ordinary form, much developed, and filled with ovules. Not infrequently the ovarian stamens had their anthers tipped with a small stigmatic surface, thus indicating the close association of the sexual elements in floral structure. Upon making camera drawings of the stigmatic surface of the inner and the outer pistil a considerable difference was evident. On the primary pistil the papillæ were twice the size of those of the inner, and were covered with small globules of oil, a fact not observed with the inner stigma. This difference may be due to the inner pistil being immature. This view is supported by the fact that no great difference was found between pollen from the outer and inner stamens, the size in both varying from 45μ to 50μ.

A striking abnormality was also found in the common garden "Bouncing Bet" (*Saponaria officinalis*). Two is the normal number of styles, but in many flowers there are three of equal length, and in addition an inner and longer one, as if the placentæ had been prolonged and tipped with a style and stigma. Upon removing the three carpels the central column is left behind, along with several strands of tissue to which ovules are attached. Each of these strands ends in from two to five long, slender bodies, which, owing to lack of space, are usually somewhat twisted. The upper portion of these prolongations has the same exterior as the styles proper; they are, in other words, secondary styles with stigmas, and seem to aid in the pollenation of the ovules, which, owing to the abnormal growth, have no other means of effecting fertilization. A still more striking result of the doubling of the *Saponaria* is one that corresponds with that of the *Petunia*, and where the primary pistil becomes very large, resembling a bud in the center of a flower, in which is a tiny blossom in all its parts. There are all gradations between this last mentioned form and that where only the ordinary doubling of the stamens has taken place and a normal pistil stands in the center of the flower.

The common garden *Pæonia* is an excellent illustration of doubling in a large flower. In the ordinary blossom there are a hundred or more stamens, which nearly all disappear, and instead there are as many petals when the flower is fully doubled. Frequently the reduction of stamen to petal has not been completed, and the organ exhibits the blended characteristics of the two—a matter of common observation and meriting no further comment here. A point of more than passing interest is the behavior of the few large pistils, usually three to five, which form the central part of the doubled flower. Not infrequently one or more of these pistils become highly colored and greatly enlarged, so as to appear like unusually large, thickish, crumpled petals. In many instances there is a striking difference in color between the pistil-petals and the stamen-petals, thus offering a sharp separation between the two sets of metamorphosed organs. All gradations between the fully developed pistil-petals, with its bright color and rigid structure, and the perfect pistil, could be found upon the same plant, and frequently upon the same flower. It was not unusual to find one half of the pistil petaloid, while the balance had its free edge turned inward, bearing a few ovules along the half developed placenta. One of the most striking transformations was that where one side of the enlarged misshaped pistils bore ovules freely exposed, while the opposite edge, slightly separated from it, had developed into a much enlarged anther with its two lobes. Several flowers were found with a single stamen, seemingly occupying the position of a pistil; such stamens were many times the ordinary size, and almost sessile, upon a very thick filament not unlike the base of an ordinary ovary. This view of the centrally located stamen, sometimes actually surrounded by the pistils, is supported by the observation of a modified form combining the characteristics of both stamen and pistil. For example, an organ was found with one lobe complete, while the other terminated midway, being replaced below by a row of ovules.

Figure 1 shows an ordinary *Petunia* pistil ; at figure 2 is seen one much swollen, and figure 3 exhibits a well developed specimen of the remarkable doubling. The upper portion consists of protruding, highly colored petals, while in the center of all is seen the secondary pistil. At *a* is the style and stigma of the primary pistil.

Figure 4 exhibits one of these stamen-pistils with the anther lobe conspicuous upon the right hand, and a number of imperfect ovules to the left and below.

In figure 5 is shown a section through a similarly deformed organ, with an ovule upon the left hand, and the anther lobe and pollen grains to the right.

From the size and central position, it is evident that these organs are metamorphosed pistils.

Notes upon Epigæa Repens.

By Byron D. Halsted.

Dr. Gray stated long ago* that the trailing arbutus flowers are of two kinds, each with two modifications. The two sorts are characterized by the perfection or abortive nature of pistils and stamens respectively, and the modifications resided in the varying lengths of the essential organs. The two kinds indicate a decided tendency towards diœcism, and the modifications suggest dimorphism.

Of sixty flowers. from as many plants, examined recently, forty had the stamens predominating, and in these, sixteen had the style longest, fourteen with the stigmas and anthers even, and ten having short styles. In the remaining twenty, with strong pistils, eleven had the style shorter and nine longer than the filaments. It is evident that while there is a hint of dimorphism it is not far advanced. Many kinds of flowers exhibit equally great variations and are not dimorphic. More than this, if dimorphism was prevailing we should expect to find a difference in the size of pollen between the short and long stamens, but this is not apparent. There are not two sizes as found in dimorphic flowers. It seems evident that but little stress should be laid upon the sug-

---

*Am. Jour. Science, July, 1876 : Am. Nat., Aug., 1876.